

# Welcome to SBNW11

W.C. Louis (LANL) May 12, 2011

- What is Short Baseline?
- Motivation for SBNW11
- SBNW11 Goals

# What is Short Baseline?

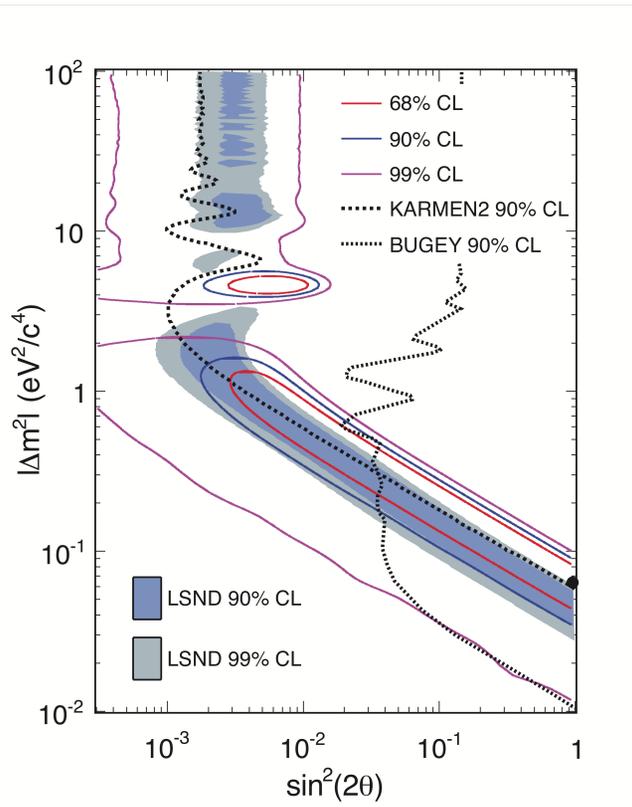
- “Short” refers to  $L_\nu/E_\nu$  and not just  $L_\nu$
- Note that  $L_\nu/E_\nu$  is proportional to the  $\nu$  lifetime in its CM frame
- Our definition of “Short” is  $L_\nu/E_\nu \sim 1$  (km/GeV or m/MeV)
- This definition includes radioactive  $\nu$  source experiments ( $\sim 1$  m/1 MeV), reactor  $\nu$  experiments ( $\sim 5$  m/5 MeV), accelerator  $\nu$  experiments ( $\sim 1$  km/1 GeV), & IceCube atmospheric  $\nu$  ( $\sim 1000$  km/1 TeV)

# Motivation for SBNW11

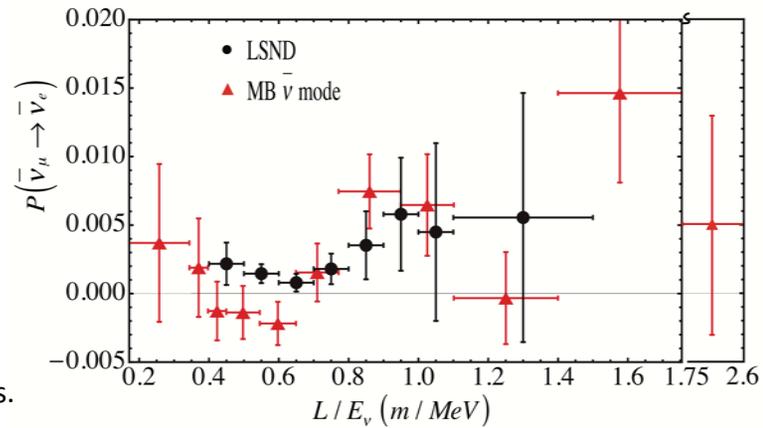
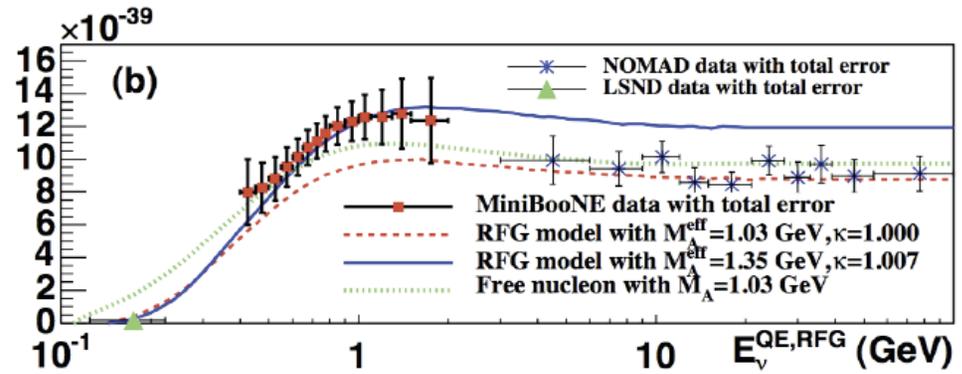
- Tantalizing results from short (& long) baseline experiments (LSND, MiniBooNE, MINOS, Reactor Antineutrinos, Radioactive Neutrino Sources, etc.) may possibly have a profound impact on our understanding of particle & nuclear physics
- Neutrino cross sections are very interesting: nuclear effects, short-range correlations, pion exchange currents, pion absorption, initial state interactions, & final state interactions make this a rich and compelling area of study

# LSND & MiniBooNE Antineutrino Results

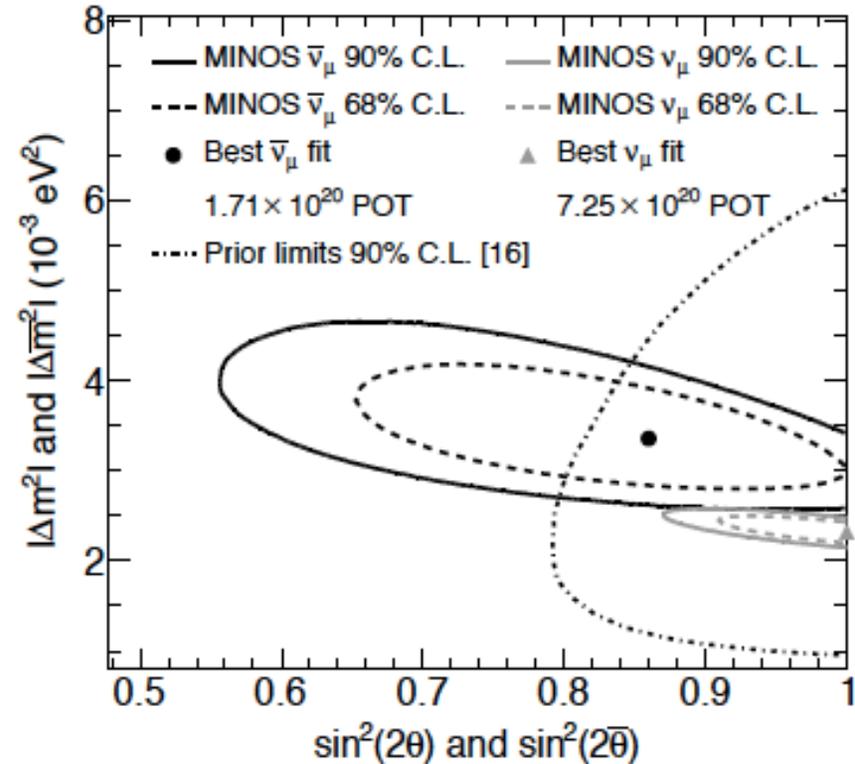
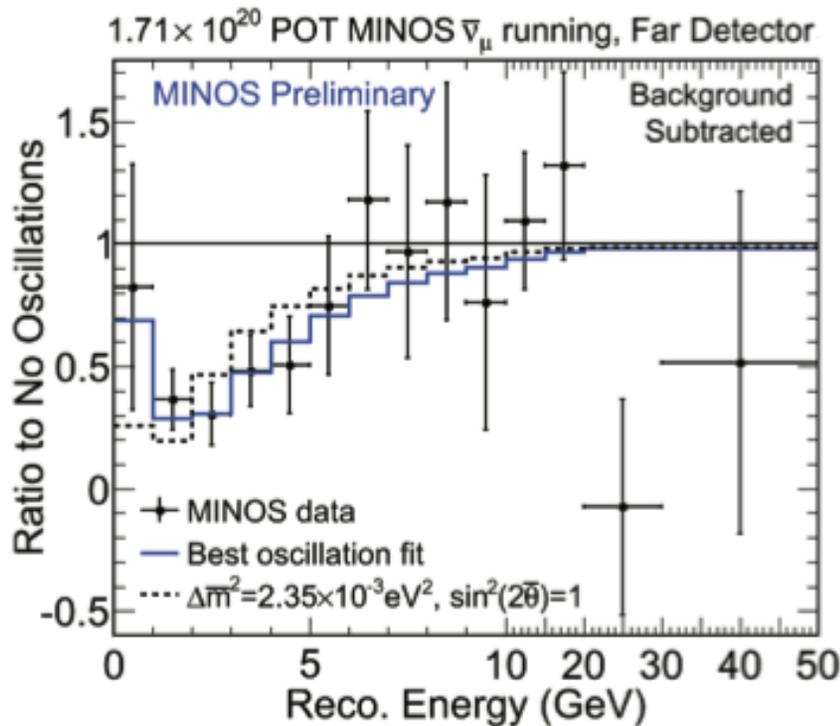
A.A. Aguilar-Arevalo, Phys.  
Rev. D81, 092005 (2010)



A. A. Aguilar-Arevalo et al., Phys.  
Rev. Lett. 105, 181801 (2010)



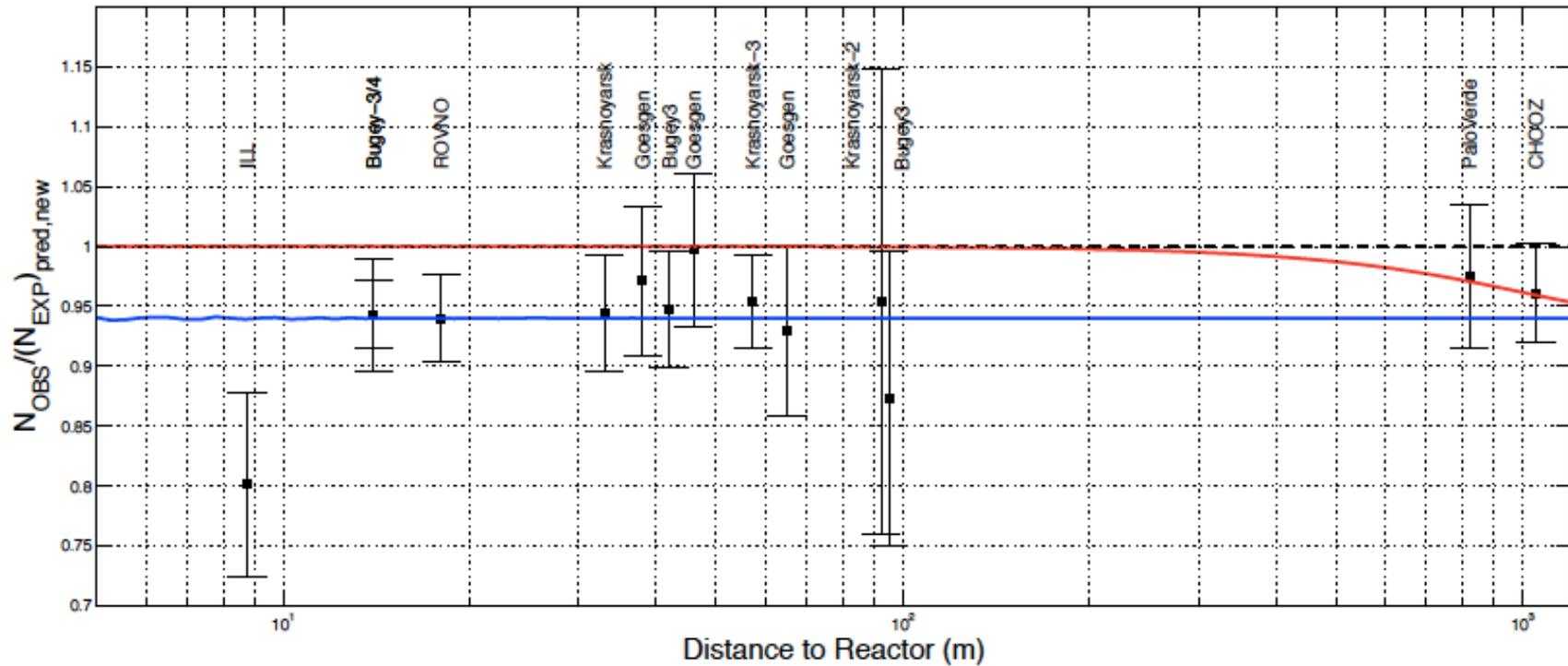
# MINOS Antineutrino Results



**“The probability that the underlying  $\nu_\mu$  and  $\bar{\nu}_\mu$  parameters are identical is 2.0%.” (arXiv:1104.0344)**

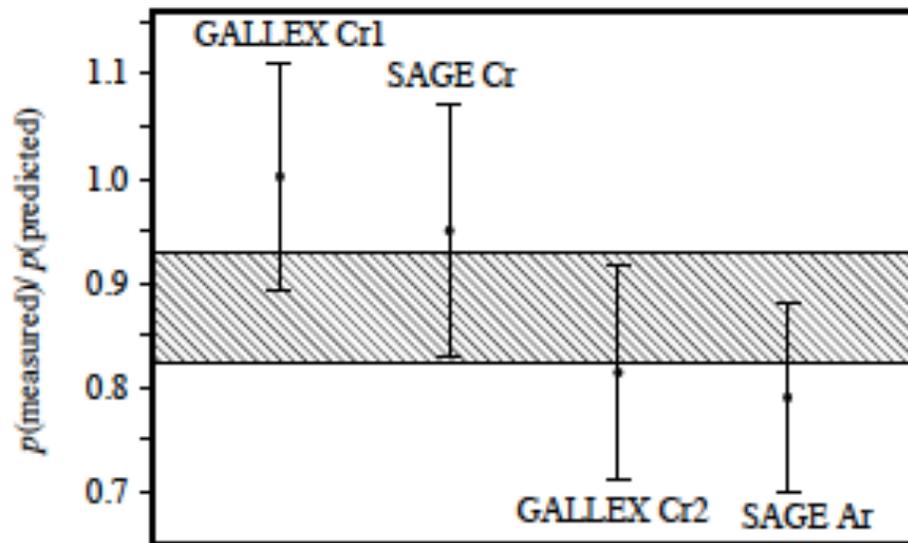
# Reactor Antineutrino Anomaly

arXiv: 1101.2755



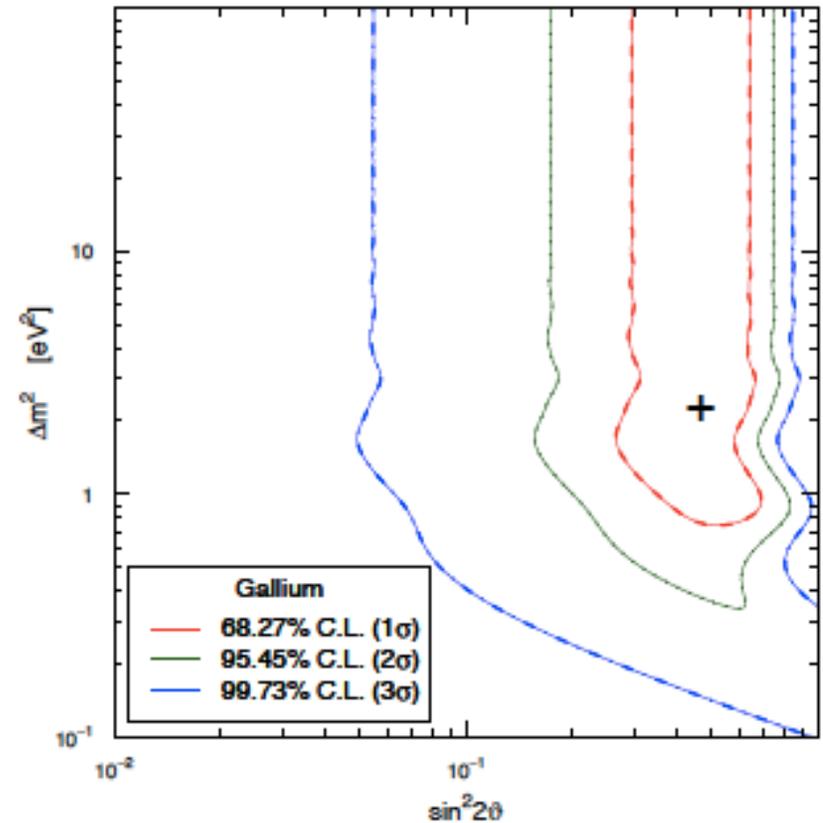
$R=0.937\pm 0.027$

# Radioactive Neutrino Sources



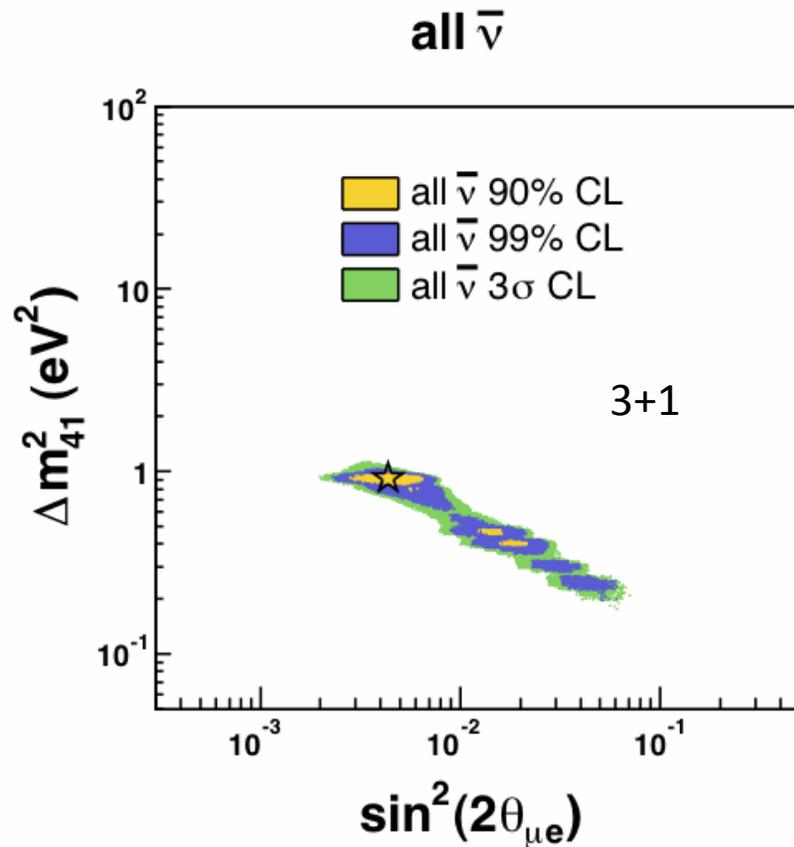
$$R=0.86\pm 0.05$$

SAGE, PRC 73 (2006) 045805  
 arXiv:nucl-ex/0512041

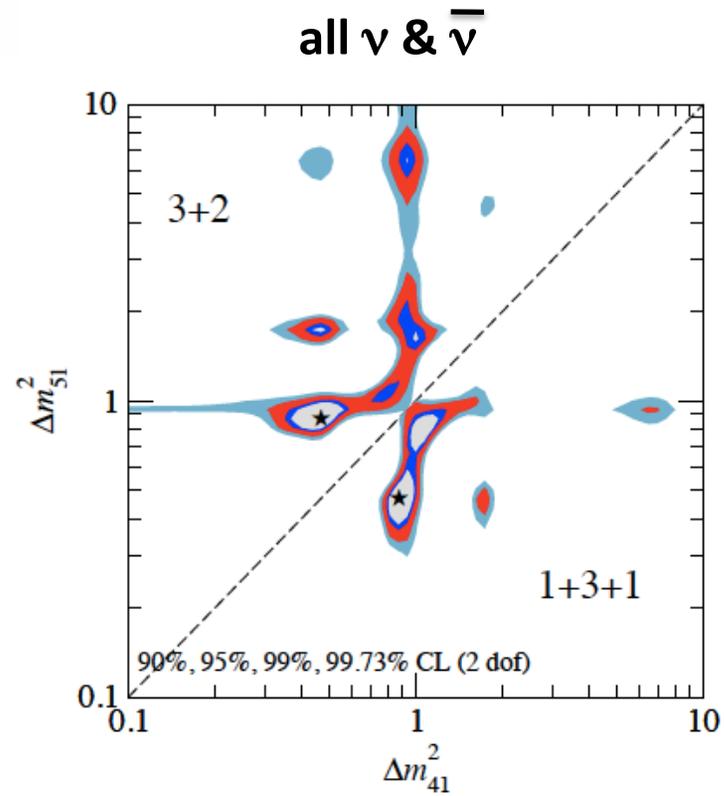


Giunti & Laveder, arXiv:1006.3244

# Global Fits to World $\nu$ Data



Updated from G. Karagiorgi et al.,  
PRD80, 07300 (2009)



Kopp, Maltoni, & Schwetz,  
arXiv:1103.4570

# Goals for SBNW11

- Discuss latest short baseline experimental results
- Discuss latest theoretical interpretations: sterile neutrinos, CP violation, non-standard interactions, axions, Lorentz violation, CPT violation, etc.
- Discuss future short baseline facilities: Project X, CERN PS  $\nu$  beam, muon storage rings, cyclotrons, etc.
- Discuss future short baseline experiments: MicroBooNE, MINERvA, T2K, NOvA, BooNE, IceCube, MINOS+, ICARUS@CERN, SciNOvA, KATRIN, Radioactive Sources, LBNE, Double Chooz, Daya Bay, etc.
- **This Workshop (hopefully) will provide information necessary for proposing future short baseline facilities & experiments**